REMARKS

Claims 1 and 7 have been amended. Claims 1 through 20 remain in the application.

The abstract of the disclosure was objected to because it contains more than 150 words. Applicants respectfully traverse this objection.

To further prosecution of this application, a new abstract of the disclosure is attached as a separate sheet to this Amendment and contains less than 150 words. It is respectfully submitted that the new abstract of the disclosure is allowable over the objection.

The drawings were objected to by the Draftsperson under 37 C.F.R. 1.84 or 1.152 because the Figures 1 and 2 top left margins are unacceptable. The drawings were also objected to under 37 C.F.R. 1.83(a) because the drawings must show every feature of the invention specified in the claims. Applicants respectfully traverse both of these objections.

Attached to this Amendment is a copy of the drawings for Figures 1 and 2 with proper top left margins and Figures 3A through 5 with lines, numbers and letters that are uniformly thick and well defined, clean, and durable. As to items 62 and 42, it is clear from Figure 1 that the design team 64 is viewing the items 62 and 42. As to claim 7, this claim has been amended to recite a system and not a method. Also, the subject matter of claim 7 is a ratio that is described in the specification and is not required to be stated or illustrated in a drawing. Therefore, it is respectfully submitted that the drawings are acceptable over the objections.

Claims 1 through 20 were rejected under 35 U.S.C. § 103 as being unpatentable over Socks et al. (U.S. Patent No. 5,831,584) in view of Walker et al. (U.S. Patent No. 5,963,891). Applicants respectfully traverse this rejection.

U.S. Patent No. 5,831,584 to Socks et al. discloses a hand calibration system and virtual display selection for a vehicle simulator. A system 10 includes an actual space 12 and a

seat 14 mounted in the space 12. A person 16 having a hand 18 can sit on the seat 14 and grasp an actual steering wheel 20 that is rotatably mounted in the space 12. Also, the person 16 can depress actual brake and accelerator pedals 22, 24 that are movably mounted in the space 12. The person 16 can view a visual display element, such as goggles 26 which are worn by the person 16. The goggles 26 are suitable virtual reality goggles which include left and right two- or three-dimensional visual display screens which respectively present to the person's left and right eyes a virtual image of the actual space 12. The virtual image of the space 12 includes images of the actual components in the space 12, as the components would actually be seen by a person sitting in the seat 14. Also, the virtual image of the space 12 that is presented by the goggles 26 includes images of simulated objects that are in the virtual space but not in the actual space, as the objects are intended to be seen by a person sitting in the seat 14 were the objects actually present at their simulated location in the space 12. The image of the virtual space 1212 presents an image of a virtual hand 1818 that is located relative to the virtual space 1212 analogously to where the actual hand 18 is located relative to the actual space 12. The person 16 can attempt to manipulate one or more of the virtual objects shown on the goggles 26, and in so doing, observe the image of his virtual hand 1818. Socks et al. does not disclose a computer system for digitally creating a virtual environment having a virtual human immersed within the virtual environment, wherein the virtual environment includes the vehicle design and the virtual human virtually represents a scaled evaluator.

U.S. Patent No. 5,963,891 to Walker et al. discloses a system for tracking body movements in a virtual reality system. A sensing section 56 includes a sensor cable 64 coupled to a transducer 62. A flexible support cable 66 is provided for supporting the sensor cable 64. The support cable 66 is provided to control flexure of the sensor cable 64 by maintaining the curvature of the sensor 64 along a selected axis and to prevent inadvertent flexure or crimping of

the cable 64. A guide tube 68 is disposed over the support cable 66 and interposed between the cables 66, 64 to allow relative longitudinal movement therebetween. The guide tube 68 preferably comprises a resilient material, such as extruded nylon, and has a smooth inner surface 70 to allow the support cable 66 to move freely about therein. The support cable 66 has a diameter of approximately 1/4 inch and preferably comprises a flexible metal alloy, such as brass. The support cable 66 and guide tube 68 are disposed in an opening 72 in the housing 58 and are secured therein to couple the cable 66 and tube 68 to the housing 58. The support cable 66 and guide tube 68 are secured to the housing 58 to prevent the sensing section 56 from detaching from the signal generating section 54. An analog-to-digital (A-D) signal converter 154 provides a representative data value for each of the signals generated by the bend sensors 16 and pressure sensors 18. The A-D converter 154 may have an input 156 coupled to the data bus 148 to receive analog signals and have an output 158 coupled to the processor 150 for providing the processor 150 with digital data representing the movement indicating signals. Alternatively, the A-D converter 154 may comprise a program stored in the memory device 152 and invoked by the processor, or may comprise a portion of the processor 150 itself. After the analog signals are converted to digital values, the data is normalized to provide signals indicating actual movement of the articulations of the wearer 20. The data is normalized to calibrate the bend sensors 16 to accommodate varying ranges of motion, for example, of different wearers of the system 10. The calibration procedure enables the transducers 62 and potentiometer 122 to provide signals to the data unit 142 within a desired arbitrary data range for determining the range of motion of the monitored articulations. Walker et al. does not disclose a computer system for digitally creating a virtual environment having a virtual human immersed within the virtual environment, wherein the virtual environment includes the vehicle design and the virtual human virtually represents a scaled evaluator.

In contradistinction, claim 1, as amended, clarifies the invention claimed as a system for subjective evaluation of a vehicle design within a virtual environment using virtual reality including a scaleable physical property representative of the vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design. The system also includes a computer system for digitally creating a virtual environment having a virtual human immersed within the virtual environment, wherein the virtual environment includes the vehicle design and the virtual human virtually represents a scaled evaluator. The system includes a motion capture system for sensing a motion of the evaluator and communicating the sensed motion of the evaluator to the computer system, so that the motion of the evaluator controls the motion of the virtual human in the virtual environment. The system further includes a virtual reality display mechanism operatively communicating with the computer system, for providing the evaluator a view of the virtual environment while evaluating the vehicle design.

The United States Court of Appeals for the Federal Circuit (CAFC) has stated in determining the propriety of a rejection under 35 U.S.C. § 103, it is well settled that the obviousness of an invention cannot be established by combining the teachings of the prior art absent some teaching, suggestion or incentive supporting the combination. See In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 U.S.P.Q. 657 (Fed. Cir. 1985); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 221 U.S.P.Q. 929 (Fed. Cir. 1984). The law followed by our court of review and the Board of Patent Appeals and Interferences is that "[a] prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." In re Rinehart, 531 F.2d 1048, 1051, 189 U.S.P.Q. 143, 147 (C.C.P.A. 1976). See also In re Lalu, 747 F.2d 703,

705, 223 U.S.P.Q. 1257, 1258 (Fed. Cir. 1984) ("In determining whether a case of prima facie obviousness exists, it is necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification.")

None of the references cited, either alone or in combination with each other, teach or suggest the claimed invention of claim 1. Specifically, Socks et al. '584 merely discloses a hand calibration system and virtual display selection for a vehicle simulator in which an image of a virtual hand is located relative to a virtual space analogously to where an actual hand is located relative to an actual space. Socks et al. '584 lacks a computer system for digitally creating a virtual environment having a virtual human immersed within the virtual environment, wherein the virtual environment includes the vehicle design and the virtual human virtually represents a scaled evaluator. In Socks et al. '584, only an eye and hand of the evaluator is immersed within the virtual environment and, therefore, the use of such a virtual reality vehicle simulator is limited to studies involving an evaluator's hand and view. Walker et al. '891 merely discloses a system for tracking body movements in a virtual reality system in which analog signals are converted to digital values and data is normalized to provide signals indicating actual movement of articulations of a wearer. Walker et al. '891 lacks a computer system for digitally creating a virtual environment having a virtual human immersed within the virtual environment, wherein the virtual environment includes the vehicle design and the virtual human virtually represents a scaled evaluator. As such, there is no suggestion or motivation in the art to combine Socks et al. '584 and Walker et al. '891 together.

The present invention sets forth a unique and non-obvious combination of a system for subjective evaluation of a vehicle design within a virtual environment using virtual reality personally immerses a digital human representing the full-body of an evaluator into a

virtual vehicle environment. The reference, if modifiable, fails to teach or suggest the combination of a system for subjective evaluation of a vehicle design within a virtual environment using virtual reality including a scaleable physical property representative of the vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design, a computer system for digitally creating a virtual environment having a virtual human immersed within the virtual environment, wherein the virtual environment includes the vehicle design and the virtual human virtually represents a scaled evaluator, a motion capture system for sensing a motion of the evaluator and communicating the sensed motion of the evaluator to the computer system, so that the motion of the evaluator controls the motion of the virtual human in the virtual environment, and a virtual reality display mechanism operatively communicating with the computer system, for providing the evaluator a view of the virtual environment while evaluating the vehicle design as claimed by Applicants. The Examiner has failed to establish a case of prima facie obviousness. Therefore, it is respectfully submitted that claim 1 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 103.

As to claim 8, claim 8 claims the present invention as a method of subjective evaluation of a vehicle design within a virtual environment using virtual reality. The method includes the steps of preparing an evaluator of a vehicle design for immersion as a virtual human in the virtual environment, wherein the virtual environment is created within a computer system and includes the vehicle design. The method also includes the steps of determining a scale ratio for the evaluator, wherein the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of a target population. The method includes the steps of preparing an adjustable property using the vehicle design and the scale ratio and growing the virtual human within the virtual environment to virtually represent a scaled

evaluator. The method further includes the steps of aligning the virtual human in the virtual environment with the evaluator and the property, performing the evaluation of the vehicle design by the evaluator, and using the evaluation of the vehicle design in the design of the vehicle. Claim 15 is similar to claim 8 and includes other features of the present invention.

None of the references cited, either alone or in combination with each other, teach or suggest the claimed invention of claims 8 and 15. Specifically, Socks et al. '584 merely discloses a hand calibration system and virtual display selection for a vehicle simulator in which an image of a virtual hand is located relative to a virtual space analogously to where an actual hand is located relative to an actual space. Socks et al. '584 lacks growing a virtual human within a virtual environment to virtually represent a scaled evaluator. In Socks et al. '584, only an eye and hand of the evaluator is immersed within the virtual environment and, therefore, the use of such a virtual reality vehicle simulator is limited to studies involving an evaluator's hand and view. Walker et al. '891 merely discloses a system for tracking body movements in a virtual reality system in which analog signals are converted to digital values and data is normalized to provide signals indicating actual movement of articulations of a wearer. Walker et al. '891 lacks growing a virtual human within a virtual environment to virtually represent a scaled evaluator. As such, there is no suggestion or motivation in the art to combine Socks et al. '584 and Walker et al. '891 together.

The present invention sets forth a unique and non-obvious combination of a system for subjective evaluation of a vehicle design within a virtual environment using virtual reality personally immerses a digital human representing the full-body of an evaluator into a virtual vehicle environment. The reference, if modifiable, fails to teach or suggest the combination of a method for subjective evaluation of a vehicle design within a virtual environment using virtual reality including the steps of preparing an evaluator of a vehicle design

for immersion as a virtual human in the virtual environment, determining a scale ratio for the evaluator, preparing an adjustable property using the vehicle design and the scale ratio, growing the virtual human within the virtual environment to virtually represent a scaled evaluator, aligning the virtual human in the virtual environment with the evaluator and the property, performing the evaluation of the vehicle design by the evaluator, and using the evaluation of the vehicle design in the design of the vehicle as claimed by Applicants. The Examiner has failed to establish a case of prima facie obviousness. Therefore, it is respectfully submitted that claims 8 and 15 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 103.

Obviousness under § 103 is a legal conclusion based on factual evidence (In re Fine, 837 F.2d 1071, 1073, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988), and the subjective opinion of the Examiner as to what is or is not obvious, without evidence in support thereof, does not suffice. Since the Examiner has not provided a sufficient factual basis, which is supportive of his/her position (see In re Warner, 379 F.2d 1011, 1017, 154 U.S.P.Q. 173, 178 (C.C.P.A. 1967), cert. denied, 389 U.S. 1057 (1968)), the rejection of claims 1 through 20 is improper. Therefore, it is respectfully submitted that claims 1 through 20 are allowable over the rejection under 35 U.S.C. § 103.

Based on the above, it is respectfully submitted that the claims are in a condition for allowance, which allowance is solicited.

Respectfully submitted,

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